Tuck and assistant in good guys' lab.

Photos by Larry Barbier

Innerspace: a Microscopic Adventure

Produced by Mike Finnell
Directed by Joe Dante
Andrew Laszlo, ASC, director of photography

by Ron Magid

Prior to his involvement with *Poltergeist II,* cinematographer Andrew Laszlo, ASC, was perhaps best known for his suspenseful action film work on such projects as *First Blood, Streets of Fire,* and *Remo Williams.* With *Innerspace,* Joe Dante's comedic reinterpretation of the '60s science fiction classic, *Fantastic Voyage,* Laszlo is very likely to cement his niche among the elite minority of cinematographers who can handle the rigorous demands of special effects filmmaking. As in its '60s counterpart, *Innerspace* deals with the miniaturization of a man to microscopic size who is then injected into the body of another human being, where the minute dimensions of organs, veins and arteries suddenly loom like vast expanses of an unknown universe to the tiny explorer. For Laszlo, bringing *Innerspace* to convincing cinematic life meant facing some of the most difficult challenges of his varied career.

Laszlo joined the *Innerspace* team because he was impressed by a number of Dante's earlier efforts, including *The Howling* and *Gremlins,* and because the bizarre technical demands intrigued him. "I liked the fact that Joe was very definite," Laszlo says. "I found him totally committed to the project, and I also found him to be a terrific motion picture historian. He was so knowledgeable about filmmaking, and once he made a decision as to

how a scene should be shot, I'd never have to elaborate on the consequences of his approach. Joe knew exactly what he needed and what he didn't need, and that's the way we shot the picture. I think the final result is very worth while."

One of the most rewarding aspects of shooting *Innerspace* was the opportunity it provided Laszlo to experiment with the new Kodak 5297 stock, which was extremely difficult to get in sufficient quantities in time for the scheduled start of shooting last summer. "The 97 has an incredibly good emulsion," Laszlo says, "and we used it in daylight interior and exterior situations, especially where the interiors were mixed with the exteriors. Just before we started the picture, Kodak released the emulsion but it was not commercially available – in fact, they only had some hand marked 400 foot loads to give as samples.

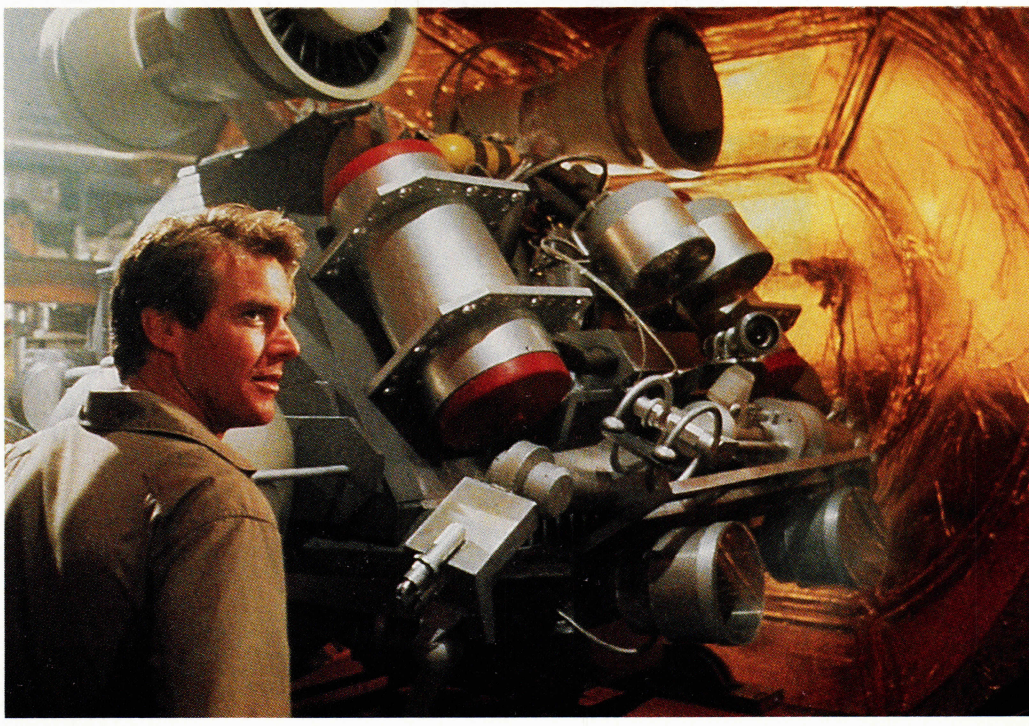
"When I tested it, it looked so unbelievably great that we persuaded Kodak to give us all their samples because they didn't expect any of the emulsion would be commercially available until last September, by which time most of our exterior shoot would've been finished. Bob Rowe of Kodak in Los Angeles was really fantastic – he called all over the place and just about hand collected the emulsion so I could have it for the film. It really worked great, and I'm very pleased to claim the distinction of being the first cinematographer to use the new stock in a feature film. We also used 5294 and 5247 throughout the shoot."

As with most of Dante's films, the characters of *Innerspace* fall neatly into two categories: good guys and bad guys. In this case, these groups are represented by two rival factions of scientists – an underfinanced team of conscientious inventors who want to turn over the results of their experiments to our government, and a bunch of ruthless, well-heeled hoodlums who would sooner see the power of miniaturization in the hands of some foreign adversary. Although the battle lines have been drawn in strong shades of black and white, Laszlo chose a subtle contrast in lighting the color schemes to characterize the relatively low-tech lab of the good guys versus the super-sophisticated lab of the bad guys.

"Our first shot in the bad guy's lab was actually set in the office of the film's villainess, played by Fiona Lewis," Laszlo recalls. "Because of the nature of this particular character, everything in her office was painted white and I felt there should be an icy cold, businesslike, non-compassionate type of feeling to the set, so I proposed to light it with an icy blue. Through the venetian blinds of this office, however, we caught a glimpse of the lab itself, which at that time, I had lit with the regular 32-3400 Kelvin lights, which in comparisonwould have appeared quite orange. At this point I mentioned to Joe that I thought it would be a good idea to carry this blue theme in Fiona's office right on through into the lab. Iknew that to use the orange lamps in the lab would be more than a problem, it would be a mistake.

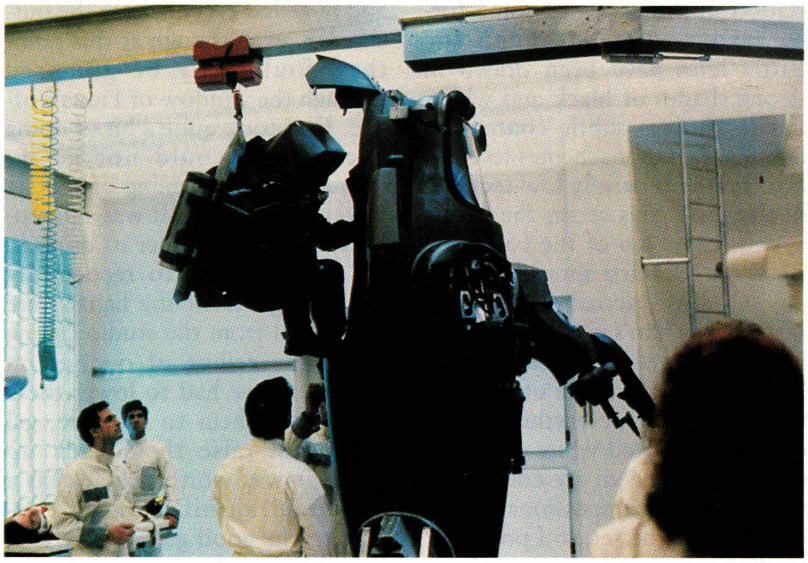
"We stopped shooting and re-gelled every light in the outside lab, even though at this point they could only be glimpsed through the window of Fiona's office. That took quite a bit of doing because we could not go up through the full ceiling of the set to get to our lights. It was a practical ceiling, so in order to do that, we would've had to reconstruct the ceiling. All of the lights were suspended from the studio ceiling above the ceiling of our set on pulleys, so we had to lower these lights, pull them to the side, gel them and raise them back up again. It was worth it.It is also a very good identification in contrast to the good guy's lab, which was done with normal, cheapo overhead fluorescent lights. Consequently, you have no doubt at any time during the film, just by looking at the color of the lamps in the two labs, where you are.

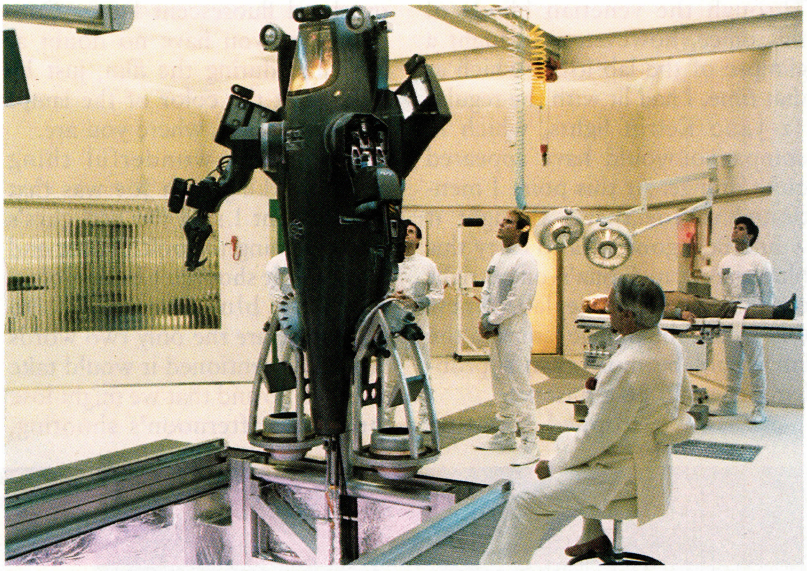
"The wonderful thing about working with Joe was that the moment I said the bad guys's lab was going to look orange and that I felt it shouldn't be just blue, but very blue, he said, 'Do it!' – those are the only two words he said. I mentioned it would take hours to do and that we might lose the whole afternoon's shooting,



Tuck (Dennis Quaid) prepares to enter his pod.

Top: ***Pod to be miniaturized and sent through human body.*** **Center:** ***Kevin McCarthy (bad guys' lab) surveys their pod.*** **Below:** ***Villains Lewis, McCarthy and crew insert pod into Short's body.***





but he understood immediately how important this was.

"A lot of the lighting in the two labs comes from lighting units that were actually designed in and built into our set," Laszlo continues. "Jim Spencer, our production designer, and Bill Matthews, our art director, are two very talented people, and we discussed for hours on end how we could utilize and live with the lighting we all wanted to design into the set. Also, Jim and Bill designed both of these sets with four walls and a full ceiling, so that unlike traditional movie sets, they were actually practical locations. The walls could be removed, but the ceilings had to remain."

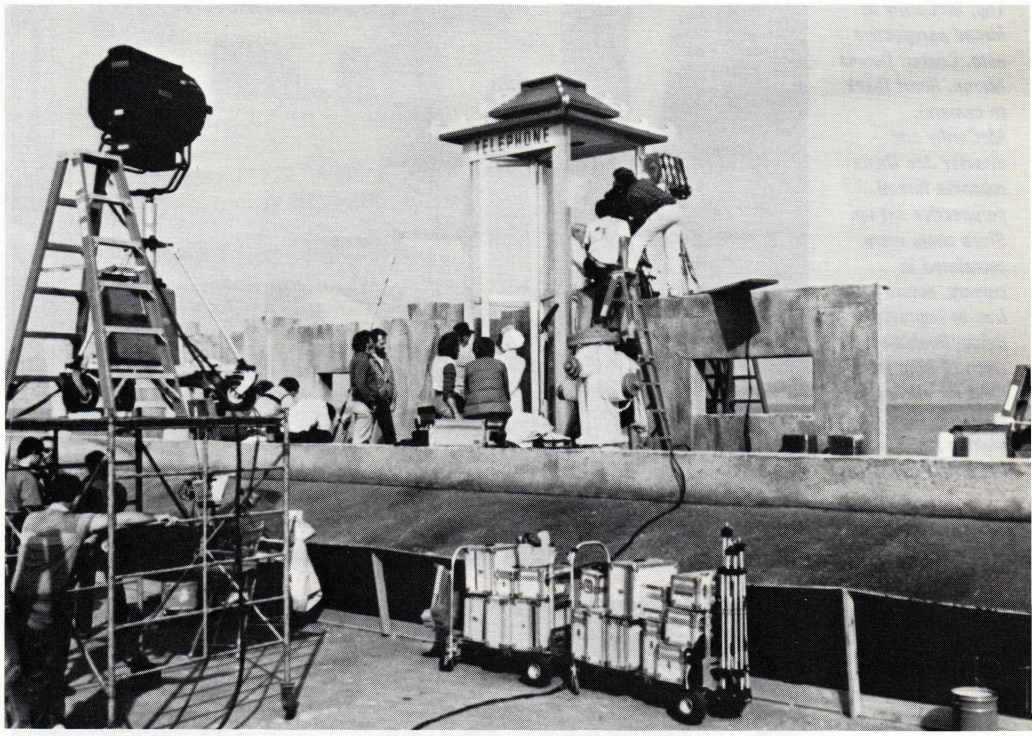
Filming the miniaturization process as it occurs in both labs was just the beginning of the on-set physical effects that characterized some of the more difficult aspects of the shoot. While most of the miniaturization process in the bad guys's lab occurs almost off-screen, Dante wanted to show the entire involved metamorphosis on-screen as good guy astronaut Dennis Quaid is reduced to microscopic size along with his transportation throughout the arterial freeways: a modified aquatic pod.

The process begins when the full-sized pod and its occupant are loaded into what Laszlo and company affectionately call "the cooker," a huge miniaturization chamber lined with gold aerospace foil, which commences to close hydraulically, sealing the pod in a vacuum chamber. "After the doors of the cooker close," Laszlo recalls, "the pod begins its miniaturization phase. The miniaturization maneuver involves the pod spinning faster and faster until it reaches a certain velocity, at which time what we call 'the laser burst,' a blast of brilliant light, can miniaturize it. In photographic terms, we had to create a 'space shot countdown' type atmosphere, and we had to create the illusion that the pod was spinning at such a fast rate that its image became stroboscopic.

"The effect we wanted to achieve was one where the pod would first blur and then seem to become almost transparent, but the pod itself couldn't spin that fast, so we used a device attached to the camera called a speed aperture control. This allowed us to regulate the frame rate of the camera. It automatically computed and set the proper exposure correction into the iris ring of the camera, so that as the speed of the camera changed, the exposure appeared to remain constant. As a result, we started the spin at the normal camera speed of 24 frames per second, and then by reducing the speed gradually to 3 or 2 frames per second, we achieved the appearance of an enormous acceleration that created an almost total wipeout of the detail of the pod, so certain portions appeared almost transparent. At the end, we exploded a bunch of our long duration photo flashes to create the laser burst inside."

In the good guys' lab, the laser burst consists of a huge, blinding flash, similar to a small atomic explosion, which makes the entire lab and the people in it seem to momentarily vanish into white obliteration. Accompanying the blast is a whirlwind rush of air being sucked towards the cooker, presumably to fill the vacuum where the pod has imploded, filled with flying paper and objects. The laser burst effect, both inside and outside the cooker, was created using cases of highly specialized, enormous, long-duration flashbulbs, which Laszlo had first used in *Poltergeist II* in a sequence where children are attacked by spirits in their bedroom.

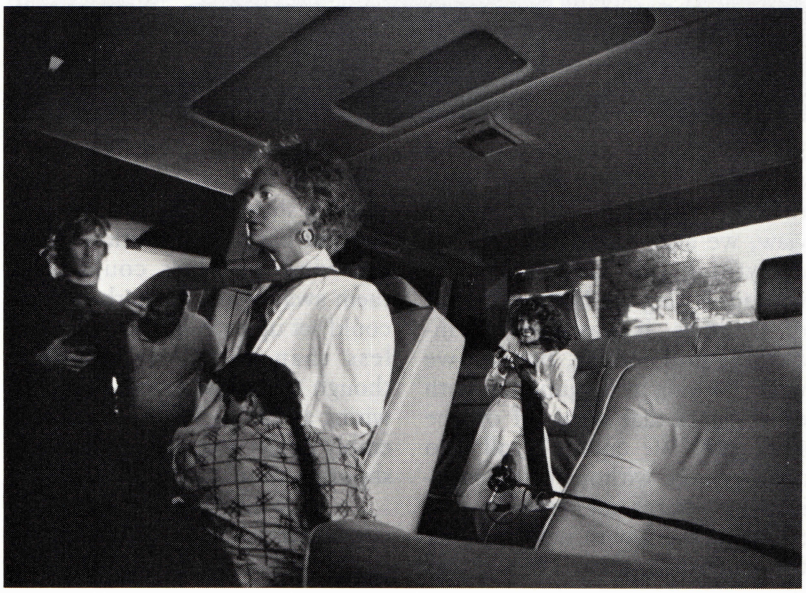
"These bulbs are enormously difficult to get," Laszlo confides. "They're manufactured only by Westinghouse, who makes two runs a year, and I think their only customers are the government and special effects houses. We bought cases of these things and loaded the entire good guys' lab setup with them in every conceivable place, and set them to all go off at once. Keeping the bulbs hidden from the camera was a bit of a trick. Not only did we want to keep them out of camera's view, we also wanted to light up everything the camera did see without letting the bulbs cast a lot of shadows. It was quite an incredible undertaking, because we were working in conjunction with other lights that went off on the same cue. We couldn't roll into another take without first removing all the burnt out flashbulbs and replacing them with new ones. At the same time, many other things had to be repositioned, like the papers that flew all over the place – every sheet had to be collected and put back into position where the wind machines could blow them away again. Remarkably, we could set up each of these shots in less than forty-five minutes, though the initial set-up involving wiring all the sockets took considerably longer and was not done on shooting time."



Top: ***Giant telephone booth constructed for miniaturized cast.*** **Left:** ***Andrew Laszlo (right) working on shoot in supermarket. Short is at left.***

While the good guys's lab consists of surplus and jerry-rigged

Top: ***McCarthy in forced perspective auto.*** **Center:** ***Dennis Muren, Short (back to camera), McCarthy and director Joe Dante rehearse forced perspective set-up. Since shots were completed in camera, actors were free to improvize.*** **Below:** ***Double-sized torso of Meg Ryan used for close views of Lewis, thus making her appear three feet tall.***



Photos by Kerry Nordquist

equipment strung together in a makeshift environment of steel piping surrounding the oversized cooker, the bad guys have been able to set up a pristine, highly refined, dirt-free, state-of-the-art lab in which miniaturization is effected at the touch of a button, with a minimum of fuss. "There's no wasted decoration, no superfluous equipment or old-fashioned machinery," Laszlo explains. "It's all business. Later on, when we see the bad guys miniaturize their astronaut, he's inserted into this elegant, black, casket-shaped pod by a winch, then, at the push of a button, the pod is lowered hydraulically into the miniaturization chamber, the lid slides down like a gigantic steel shutter, and when it's closed, a scientist pushes another button.

The laser burst in this case consists of a very faint light – there's no noise, no papers flying, no people being sucked in. All you see is this faint puff of light, and the miniaturization has been accomplished. When the shutter rolls back, the miniaturization has taken place – there's absolutely no big deal to it, it's very elegant, very simple and very state-of-the-art."

The bad guys have perfected miniaturization, it's - true – there's just one hitch: they don't understand how to effect re-enlargement. This renders their technology worthless, unless they can steal the secret from our heroes, who know the answer. The secret is hidden inside two microchips buried in the intricate machinery of the pod Dennis Quaid is using to travel through the body of what he thinks is a rabbit. Unbeknownst to our hero, he has actually been injected, quite by accident, into the body of a hypochondriac, played by Martin Short, as a result of a surprise offensive staged by the villains to capture the re-enlargement microchip.

Short is captured by the villains, who then inject their miniaturized champion into Short's body. His mission: to destroy Quaid and return with the all-

important secret of re-enlargement. Through another twist in this bizarre series of events, Short is able to turn the tables on his captors, played by Fiona Lewis and Kevin McCarthy, and in attempting to lock them away in the miniaturization chamber, he accidentally pushes the wrong button, miniaturizing the evil duo by 50%.

When Short, accompanied by his girlfriend, played by Meg Ryan, decides to take the half-sized villains for a ride in a Volvo, that's when Andrew Laszlo's cinematic headaches really began. It all started at the very first production meeting attended by Dante, his producer, Mike Finnell, Laszlo, special effects supervisor Dennis Muren and blue screen advisor Bill Hansard. To accommodate Dante's spontaneous style of comedic direction, and to minimize the hassles and expense of optically compositing much of the film's effects, Laszlo, Muren and Dante had agreed to shoot as many of the effects live on-stage as possible.

In order to make Lewis and McCarthy appear half-sized and as if they're riding in the rear of the car with a normal sized Meg Ryan and Martin Short in front, a special forced-perspective car set was to be constructed with a standard sized front seat and a double sized back seat. When shot from a specific angle against a rear-screen image of the streets of San Francisco, it was reasoned, all the lines would meet in perspective and the Volvo would appear like any other riding down the boulevard – or so the crew had hoped. Such was not to be the case, at least not exactly, as Laszlo recalls:

"As the conversation went on, the difficulties grew and grew. Since the car which was to appear normal-sized on-screen was actually much larger, the size of the screen had to be double normal size, which affected the amount of light we could throw on the screen which in turn affected the depth of focus we had to have in order to pull the illusion off. Furthermore, it was suggested that the double-sized portion of the car should be attached to the floor, while the normal front end would be placed on a platform since it had to be at a specific spot for the perspective lines to meet. I totally disagreed with this concept because the car was supposed to be veering up and down hills and around corners, and there was no way with this system to coordinate the movements of the actors as they were thrown from side to side by the G-forces.

"I realized that the only way to handle this successfully was to put both the normal sized front portion and the double sized rear end of the car on a platform, along with the camera in front of the rear projection screen, so they could all rock and move in unison. It was pointed out that such a platform would have to be over 50 feet long, and someone asked, 'Where are we going to get one?' I said I didn't know, but if we couldn't find one, we'd have to build one, and that's exactly what we ended up doing. Joe was the first one to buy the idea, and he immediately understood the advantages from a technical angle: if the actors were to try to throw themselves around the car, it would've been a hodge-podge. By using this hydraulically operated platform that shook and rocked, all of their motion would be synchronized. Joe said, 'If it's going to do that, this is the way we've got to go.'"

"This was also very helpful when we wanted to shoot the side of the car against the rear screen. If we'd been using a normal car, we would've just turned the car, left everything else in the same position and inserted a different background plate into our projector. With the forced-perspective car on the platform, as opposed to being attached to the stage floor, we could do virtually the same thing: simply turn our platform instead of ungluing everything and re-erecting it for our side shot. All we did was rotate our platform, move our camera and we were able to use the same rear screen for the side plate."

Although Laszlo's gimbal rig saved the production innumerable headaches, it's enormous size also created an arsenal of problems for the cinematographer to deal with in terms of coping with the great depth of field. "Because the whole rig was something like 50 or 60 feet long," Laszlo says, "we needed a huge rear projection screen. The throw of the projector had to be so long that we had to back our projector out of the largest stage at ILM, put it in a trailer and completely tarp it in so there would be no daylight coming in through the open doors of the stage.

"The projector had to run red hot in order to put out an exposable image, particularly since we needed a very small T-stop in order to accommodate the tremendous depth of field. The people in the front seat had to be in sharp focus, as did the half-sized people in the back seat. The rear portion of the car was four times as far from the camera as the front portion so it was a trick to keep everything in sharp focus. Behind that, we had our projection rig and we needed to shoot it all at a stop of 8. That was a very difficult thing to do."

For *Innerspace,* Dante and Laszlo hoped to create a series of definitive forced-perspective effects, building a series of gags that would astound and convince moviegoers that the half-sized villains were indeed real. To this end, they wanted to show a great deal of interaction between the miniaturized villains in the back and the full-sized heroes in the front seat of the forced perspective car, which required a great deal of ingenious thinking and a bit of help from the talented modelers at ILM.

"The problem this situation created occurs as our villains moved from the back seat forward: any motion of our half-sized villains towards the front of the car caused them to rapidly grow and lose their perspective sizes," Laszlo explains. "Since we wanted to have bodily contact between the half-sized people and the full-

sized people, we needed both half sized limb and body puppets of Kevin McCarthy and Fiona Lewis and double sized limb and body puppets of Meg Ryan and Marty Short, built by ILM in order to pay the illusion off successfully. We could then use our full-sized villains in conjunction with double sized body parts of the heroes, in order to create the illusion that McCarthy and Lewis are actually half-size. Conversely, we could also combine our normal size hero actors with half-sized puppets of the villains to reinforce this illusion.

"For example, we had a situation where we wanted to show Kevin McCarthy's half-sized hand reach over Marty Short's shoulder and hook a finger into his mouth and still use our actor in the back seat, so we used a mechanically puppeted hand while Kevin remained seated, in perspective, in the back of the car, which was actually about ten feet behind the front seat. When we then wanted to show Kevin move directly behind Marty, at which point Marty grabs him and pulls him over his shoulder into the front seat, we used a half-sized animated puppet of Kevin which was in every detail as close to a miniaturized live Kevin McCarthy as technology could make it. Now to really sell this idea, as soon as Marty Short pulls this half-sized puppet of Kevin into the front seat, our next shot shows the real Kevin McCarthy reacting to double-sized props of the car's brake and accelerator pedals and to double-sized puppet limbs of Marty Short. As Kevin climbs up and begins punching Marty in the face, we shot over the shoulder of a double sized puppet of Marty's head and upper body. By the same token, we also needed half-sized puppets of Fiona Lewis and double-sized puppets of Meg Ryan. This all had to be accomplished by using very quick cuts, but I found the final sequence very convincing and very funny."

Another equally intricate forced perspective situation oc-

curs when the half-sized villains escape from Short and Ryan and must find a way to communicate with their cohorts. They come to a phone booth, which immediately presents a ridiculous problem: how do two half-sized people make a telephone call when they can't reach the instrument? "For this gag," Laszlo recalls, "we had to have a 21 foot high phone booth, double-sized in every detail – but that wasn't enough. Since we erected the booth on one of the piers in San Francisco, we wanted to see a double-sized sea wall and a double-sized bench. We also wanted to have double-sized fishing poles, buckets and fishing tackle boxes, and, in order to really sell it, we wanted to show people who appeared to be normal-sized standing in the same shot next to the over-sized phone booth. We even had a cameo appearance by our production designer, Jim Spencer, who appears as a fisherman fishing from a normal-sized portion of the sea wall, which is actually much closer to the camera.

"Thanks to the forced perspective and the position of our camera, he really appears to be fishing from a continuation of our double-sized sea wall. In addition, quite close to camera we built an elevated portion of the street, because our camera had to be elevated well above street level to accommodate the 21 foot high phone booth. To complete the gag, on this elevated portion of the road we had a normal-sized person on a regular bicycle, so everything appears absolutely normal in size except for the two villains trying to make the phone call."

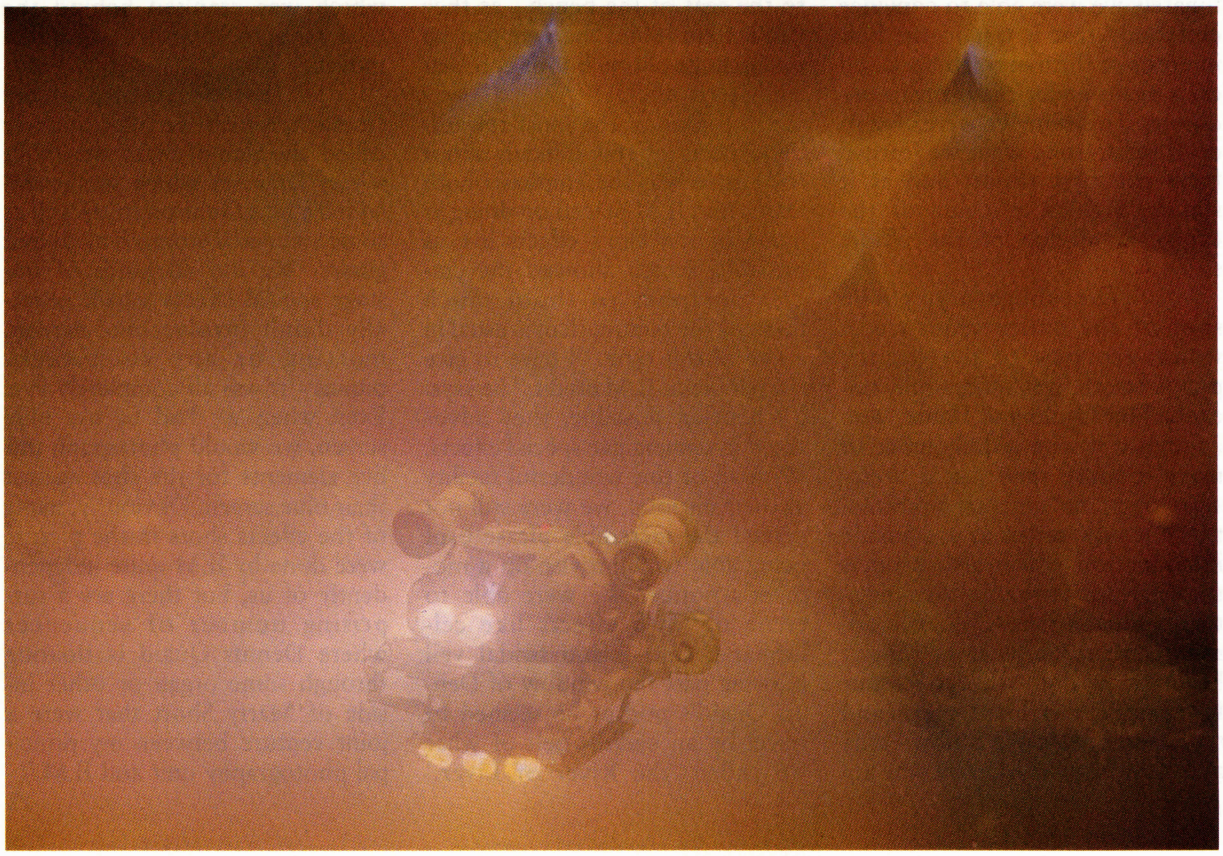
Almost as difficult as making that phone call was the task of making that shot, Laszlo reports. "It was a nightmare. It took quite a bit of doing. In fact, we shot it twice because conditions were so bad the first time that no one was satisfied by it. The time of day was wrong, the light was wrong, and the results did not do justice to what we wanted to see on the screen. I was very unhappy with the first shot, but for-

tunately we were able to convince everybody that it was in the best interests of the film to go back and do it again under the proper conditions. This time we were able to do it right, using what we learned from the first shoot, and as it stands, I think it's one of the funny highlights of the whole show."

The obligatory, cliché shot of the entire sequence, a worms-eye view of the gigantic phone booth, was successfully uncliched by Laszlo and Dante, who combined it with a dolly move to make it more than just a pretty shot of some unusual architecture – it now serves as a dramatic introduction which also propels the sequence forward. "As obligatory a shot as that is," Laszlo admits, "what helps it is that it begins as a dolly shot over our foreground pavement piece and the wood bench. We follow Fiona and Kevin – who hardly come up to the seat of the bench – as they run behind it and then we pan up to the huge phone booth and that really pays off."

One of the most rewarding aspects of this difficult shoot for Laszlo was the emphasis both Dante and ILM placed on doing as many of the film's effects live as possible, which allowed the cinematographer to shoot much more of the picture than is usual in a film of this type. "I have to give the people of ILM credit," he says. "Whenever possible, they advocated in-camera live special effects. With all of this wonderful facility at their disposal, we were still not denied the incredible pleasure of being able to improvise on a moment's notice. We were able to come up with effects like cellophane, smoke and bridal veil blowing past the window of Dennis Quaid's pod as he seemed to travel by an endless belt of what we called 'the River of Liver,' which was cranked behind the pod as both it and the camera moved.

"For the interior of the stomach, which we affectionately called 'the Slab of Blab,' they built a very large set which we lit and added a bit of motion to, as well as some simulated stomach acids and gasses. We did all kinds of on-stage special effects which generally didn't involve blue screen, matting or any such techniques – it was all completely live. Even when we had to use blue screen, we would photograph our live elements for the shot against their blue screen. Obviously, many of the effects shots in the picture were done by ILM quite independently of us, but there are a surprising number of sequences where Dennis Quaid is floating through some organ or other inside of Marty Short that were a joint venture between my principal photography unit and ILM." △



Tuck's pod falls through fat cells.

Photos by Kerry Nordquist and Roberto McGrath

Special Effects for *Innerspace*

by Ron Magid

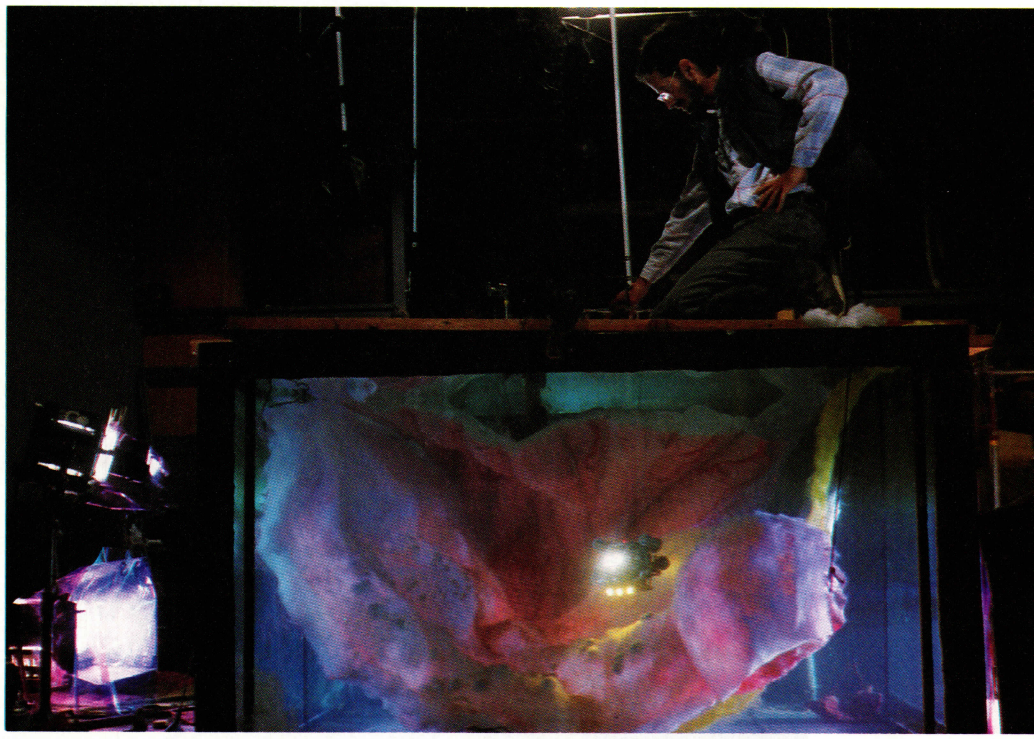
With Dennis Muren heading the unusual *Innerspace* project at San Rafael's resident effects braintrust, Industrial Light And Magic, he decided to take a very different tack: to match his effects techniques to the freewheeling, improvisational approach of the film's director, Joe Dante. Muren has long felt that too many films have been locked into post-*Star Wars* techniques when there were many older, but equally effective methods to create convincing illusions. Of these, Muren chose live forced-perspective photography and real-time miniature effects done in-camera to allow himself and his crew to emulate Dante's spontaneous filmmaking style. The results are spectacular and wholly unique visual effects.

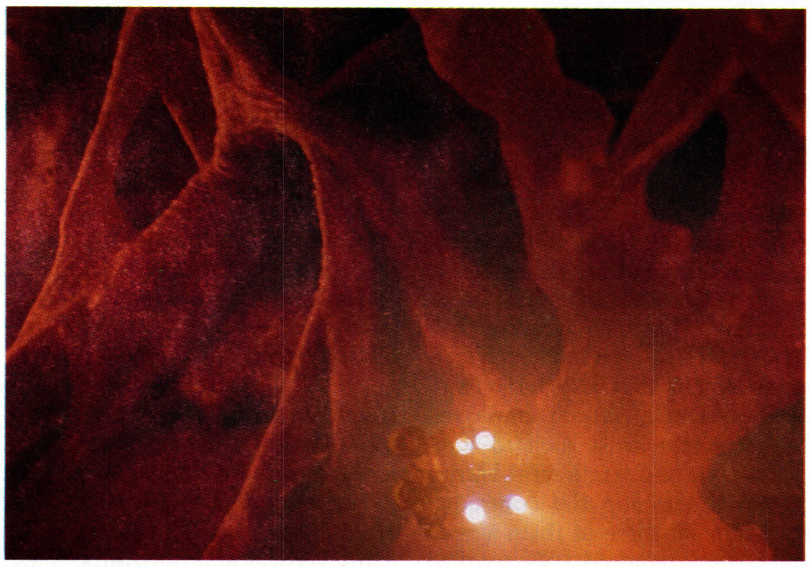
It was Muren, for example, who advocated the use of a forced-perspective car set for a sequence in which normal sized heroes, played by Marty Short and Meg Ryan, are riding in the normal sized front seat of the car, while the supposedly half scale miniaturized villains, played by Kevin McCarthy and Fiona Lewis, are confined to the car's double-scale back seat. "We were looking at perhaps as many as a dozen effects shots in that sequence which we ended up doing live," Muren says. "Mike Finnell and Joe thought of using bluescreen, but I didn't think it was appropriate.

"I've always been a fan of forced perspective. I produced *Equinox* and various other commercials over the years, and I've always admired Disney's *Darby O'Gill And The Little People* for featuring the best work ever done with this technique. I felt that here we had a perfect opportunity to use forced perspective, to build a double sized back seat and com-

bine it with a normal sized front seat and line it up in perspective. Joe and Mike couldn't quite visualize it, and they found it kind of scary because it wasn't what they were used to. So, I built a couple of mockups to show what the scale would be, and I told them about the advantages: It would be finished in the camera, we could shoot it four-perf, and, since the car was supposed to be racing up and down the streets of San Francisco, we could shake the camera to add realism. Well, they loved the idea. Andy Laszlo suggested putting the entire rig, which would be 12 feet wide by 25 feet long, on a gimbal so that all of our actors would be reacting to the motions of the car in unison. Mike Woods and his crew built the car and gimbal and everything worked out great.

"The trouble with shooting forced perspective is that you've got to be really prepared because the producers can't afford much waiting on the set while things are tweaked. Knowing that we could really get burned if we weren't careful, I had everything built, set up, and roughly lit when the crew came in, so there was virtually no wait. I had never actually done anything quite like this on such a grand scale with all the actors involved. The production people were wondering just what was going on: in effects films today, everything tends to get done one step at a time, and it's all composited at the end in optical. Using this technique, we had the whole sequence finished in less than a week."





Top: ***Marc Thorpe holds 8′ pod model within underwater set.*** **Below:** ***Tuck approaches entrance to inner ear.***

Half-sized and double-sized puppets were used to really pay off the sequence. Creature shop supervisor Evan Strongquist experimented with a new way to replicate facial forms. Muren reports: "Life masks were taken from the actors' faces and the castings were laserscanned using a system designed specifically for making minature busts of people. We first used this technique on *Star Trek IV*. They use a laser to scan the features, then that information runs a mill to make any size. We had perfect miniatures and perfect double scale likenesses of our actors, and then our sculptors did some work on the busts to open up the eyes and add skin detail."

When it came time for Muren and his crew to develop the vastly minute vistas of the human body and to place a miniature pod in those very strange environments, he decided to carry through the same live, improvisational, in-camera approach he used so successfully in the forced-perspective car situation. "It's harder to do with miniature sets and models," he admits, "and it made the shooting harder, but the look was much more organic and real. The main reason we did as much of our effects live was to give it a feeling of spontaneous reality. My approach was to do as many shots as we could in-camera as practically finished shots, because I thought that style was more in keeping with a Joe Dante film. Joe's a very spontaneous guy and his films show that. I wanted this stuff to look as if it were pho-

Rich Townsend installs tiny, ultra-bright headlights in Tuck's pod, which act as primary illumination in many of the set-ups.

tographed by a miniature Dante actually in the body and reacting to everything he was seeing."

Designing the sets themselves was Muren's greatest challenge. To create a huge environment that also looked incredibly small, Muren employed both concept artist Richard Vander Wende and art director Harley Jessup to develop the contradictory style all three of them agreed the settings required. "We worked for quite a while trying to decide what the inner parts of the body would look like," Muren recalls, "and trying to figure out how we could make this stuff seem very small but vast. We didn't want our sets to look like cathedrals or auditoriums, because I thought that was going in the wrong direction. It needed to have an organic, tiny look to it, while from the traveler's point of view things had to look like they were huge distances apart. That was quite a task to get that look into our sets, because I had a very different idea of how things should look than they did back when they made *Fantastic Voyage*, which also deals with a miniature journey through the human body.

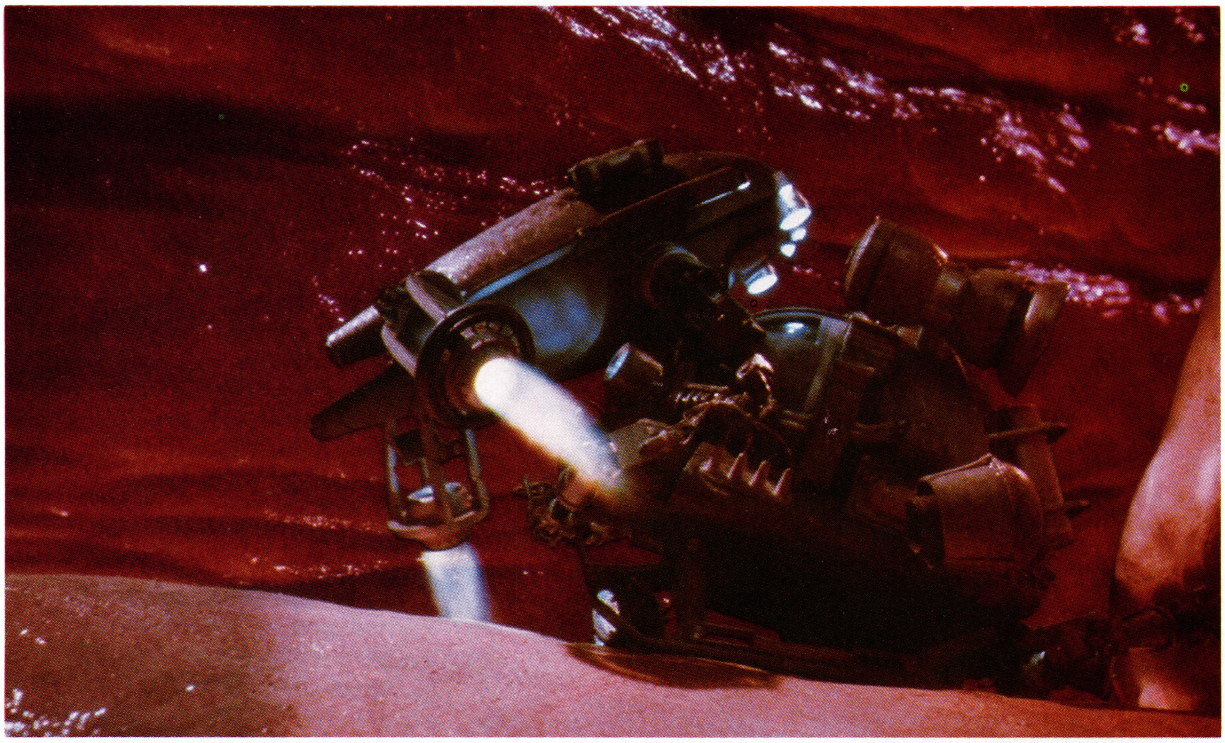
"I thought our film shouldn't have such a studio feel to it. Our is, in many ways, biologically more correct, although we did take a lot of liberties in some areas. We avoided having too many vertical and horizontal lines in our sets because there are very few such things in the human body. Consequently, everything looks skewed as much as possible, is made to look completely organic, and we kept our set pieces in motion all the time."

Once the designs of the sets were locked down, it remained for Bill George and the ILM model shop to construct the large scale miniature sets. Due to the demands of the script, which required actor Dennis Quaid, to pass through numerous areas of the body, and the demands Muren made in order to achieve his live, spontaneous effects, the model shop faced the largest miniature construction project since *Return Of The Jedi.*

"One of the odd things about *Innerspace* was that the script specified a number of locations in the body where Tuck is supposed to go only once," Muren says. "That meant that elaborate sets had to be constructed for sequences that consisted of from one to four shots, which meant we had a lot of models to make. They just didn't last long on-screen, but we wanted the film to have a very textured look and this was necessary to achieve that texture. Still, it was very expensive to build all these sets, so we used as many over again as we could, which really didn't amount to many, but there were some and every little bit helped.

"The sets were made out of large pieces of foam rubber, with bits of urethane here and there where we needed translucency for lighting. Since Marty Short's character is always on the move, I wanted his body parts to look like they were always moving, too. Some of the sets were built for use in a seven foot square underwater tank, with the back wall of set always in motion."

One of the areas where Muren and his crew had to take liberties was in the lighting of the miniature sets. "The body is really not that open," he explains. "Everything is packed in there, except for spaces like the throat. If anything, we were fighting the fact that it's very dark, which means you can't see very far, and when you can, there's just another big slab of flesh colored stuff or another grey structure over there. We didn't want it to appear overly lit in there, but it's pretty much a low-key situation with very little additional light, which made it very difficult for my cameramen, John Fante, Pete Kozachik, Kim Marks and Don Dow, to come up with good looks. When we could, we took liberties with our light-



Igoe and Tuck in battle.

ing – we tried to figure out if there was a little Andy Laszlo shooting in there, what he would do to make the lighting more interesting. There were times when the pod was closer to the skin, so in that case we would have a pinkish ambient light coming through something to punch things up. We didn't want to have a lot of pictorial design in there, however, because that would have seemed too self-conscious and would have distracted from our story."

Bearing that in mind, Muren and company couldn't resist creating some beautifully designed sets – when the story warranted them. "Of course there were times when we went with some nice looking designs," Muren admits. There's an approach to the inner ear where I felt we were close enough to the outside of the ear that you could imagine there would be light coming in to show the entrance to the inner ear. Later, when one of the pods approaches the back of the eye, it is translucent and lit up by the view Martin Short is seeing.

"They were pretty elaborate sets. Peter Kosachek did the shot of the pod as it approaches the inner ear, where it appears to be going into a big tunnel, and that shot had to be a matte shot with a miniature background and the pod matted in, because we had a lot of depth. Once we actually got inside the ear, however, all of our shots were done in-camera."

When Tuck, played by Dennis Quaid, is accidentally injected into Martin Short, ILM had to come up with two unusual models to make the sequence work. The first was a large scale syringe that was eight inches long and three inches in diameter into which a blue screen pod element was added so the camera could pull in tight on the pod and see all of its detail. The other model was of a series of fat cells that compose the microscopic structure of the body's rear.

"When the pod is first injected into Short," Muren says, "it's sitting in a great layer of fat cells. We had a lot of trouble in the beginning figuring out what fat cells should look like. We didn't want to go with something like a painting, which would seem too rigid, and we tried any number of substances but they all seemed too stiff, looked too plastic, or they didn't move right, or they looked opaque. We finally solved the problem by making a weak mixture of jello inside balloons. When we punctured the balloons, all we had were these soft, spongy lumps of jello which nearly fell apart. We made dozens of those and layered them one on top of another. When we moved them, they all sort of undulated a bit, and they had a pretty interesting translucency."

Once Quaid is able to maneuver his pod through the fat cells, he must find a quick way to get from one part of the body to the next. "Harley Jessup, our art director, and I were trying to figure out the best way to move Dennis Quaid through the body," Muren recalls. "The script took place in a number of locations throughout this body, so we finally came up with a quick method of transportation we figured the Quaid character could deal with: the bloodstream. That meant that we had to then come up with ways to get his pod into the bloodstream, and we had to imagine what the bloodstream would look like from a miniaturized astronaut's point of view. Since we were sort of using it as a freeway, we called it 'the Artery Raceway'."

Top: ***Urethane sleeve inside plexiglass water tank creates views inside the bloodstream. Camera and model pod were hung inside during shooting.*** **Below:** ***Pete Kozachik and Bob Cooper with miniature of Short's throat.***

Because Muren wanted to do as many of the Artery Raceway shots live as he could, using the miniature pod in an aquatic environment, a set had to be built that would allow for lengthy traveling moves with the pod as it went from one destination to another. "The set was about 40 feet in length and about 18 inches in diameter," Muren says. "It was filled with running water and thousands of little red blood cells that we made from a silicon compound, each the size of a silver dollar. We had a giant pump to move the water through the pipe at a very fast clip. The pipe wasn't straight, it curved around a large section of our stage floor. The entire thing was waterproof. Its sides were built out of plexiglass so we could light it from the outside. Within was a sleeve of urethane that Bill George and the model-shop guys made that had all the texture built into it so that when we backlit it, it appeared almost frontlit.

"The urethane sleeve had a ziplock at the top so that it would stay sealed until our camera and pod rig passed through any given point – then it would unzip as the rods supporting the camera and the pod model from above went by, then zip back up again in their wake. The camera was in a waterproof container. It took our cameraman John Fante many takes to get everything coordinated properly: the blood cells racing along, the camera moving at the right speed and the whole thing lit correctly. That was quite an operation. Our stagehands did a wonderful job on this film. They were called on to solve dozens of problems a day. Because many shots were done in the camera, that's where the buck stopped."

One of the film's key suspense sequences takes place in the Artery Raceway as Tuck finds himself suddenly pulled towards the heart where the pressure is so great he will be destroyed. For this sequence, the set consisted of the Raceway and a beating heart valve model that was about a foot in diameter. "The beating of the valve was handled by a couple of good stagehands directly operating it with rods," Muren recalls. "It was all rigged from behind, and we experimented with three different designs before we got what we wanted. The shot was real complex – we wanted to get the right motion to the blood cells and the right beating action to the valve. We had to shoot it three times be-

fore we got everything working properly – the right lighting and the right modelwork. We added a blue screen pod element later because of the scale."

There were two different pod models built by the model shop: that which belonged to the hero, Tuck, and that which was operated by the villainous Igoe. While Tuck's pod is a round affair that looks like a cross between the spacepods of *2001* and the spaceship some kids constructed in Dante's previous film, *Explorers*, Igoe's is a sleek, sophisticated black casket. The differences are more than esthetic: Igoe's pod, with thrusters placed at the bottom, is capable of flight, while Tuck's, with thrusters at the rear, is restricted to maneuvering in fluids. Because Tuck's pod is the one primarily seen throughout the body, several different versions were built, whereas the modelers constructed only one version of Igoe's pod. "The main version of Tuck's pod was twelve inches in diameter and was radio controlled," Muren says. "We also had an eight inch stunt pod that worked in the Artery Raceway, and a four inch pod and a one inch pod used in various places throughout. We also had a 1/3 actual size pod which was about three feet in diameter that we used in close shots. Because Igoe's pod only really appears at the end of the film we only made one pod that was about a foot long so it was in scale with our twelve inch Tuck pod. We only made one of those because we were on a really tight budget for the whole show."

The film's climax begins as a pitched battle in Martin Short's throat that ends up as a battle to the death over the pit of his stomach, and required some of ILM's most elaborate effects. "Tuck's pod is sitting on a precipice in a dry area of the throat," Muren explains. "One side drops off to the esophagus, which leads to the stomach, and on the other side is the trachea, which leads to the lungs. Suddenly, Igoe's miniaturized pod attacks Tuck's pod and they have this battle in the throat. Because Igoe's pod is capable of flying around, while Tuck's is locked in on gravity, Igoe tries to pull Tuck off the precipice, which doesn't quite work. Eventually, the combined weight of Igoe on Tuck's pod causes them to slip down towards the stomach, where they land on something soft and spongy. Their weight then causes them to fall very slowly through a valve, almost like sinking into quicksand, and they end up hanging right above the stomach below, which is this horrible place filled with acid that you never want to go to.

"It's a pretty elaborate sequence," Muren admits. "We shot all of the shots of Igoe's pod blue screen with motion controlled puppets. We had a lot of spacial things to deal with because the throat is such a wide expanse compared to how tiny their pods are. Harry Walton and Don Dow did the programming. Before they shot it, we spent a lot of time working out the whole design of what the sequence should look like and exactly how the action should occur to keep things really interesting. When Tuck's pod first falls against the valve leading to the stomach acid pit, you can't really tell until the next shot that it's made up of this quicksand-like substance. Basically, the valve was a pretty simple model made of foam rubber, and about six of us pulled the stuff apart and pushed the pod through it."

Despite the many unusual approaches Muren employed with regard to *Innerspace*'s nearly 120 effects shots, he is inclined to feel that it is design first, and technique second, that makes for successful illusions. "What hopefully makes one shot work better than another is the design. If you've got good designs and have made the right decisions and used the right techniques, then the stuff can look real. If you don't, then it doesn't. We spent a lot of time on our designs for *Innerspace* and we used a lot of unusual techniques, both old and new, and I think that combination will give the audience something they'll enjoy seeing." △